

A SIMPLE METHOD FOR MAKING FINE DISSECTING NEEDLES¹

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ABSTRACT: A simple method is described for making robust and very sharp dissecting needles by electrolytically etching tungsten wire to a fine point.

DESCRIPTORS: dissecting needles, electrolytic sharpening.

This note is to draw the attention of entomologists to a simple method for making robust and very sharp needles for dissection and other fine work. The method is based on that used to make electrophysiological micro-electrodes by electrolytically etching a fine wire (Hubel, 1957; Levick, 1972). Little skill is needed to consistently produce very sharp needles by the procedure described here and none of the dimensions or voltages quoted are critical.

Tungsten wire is used because of its toughness — it can be sharpened to tip dimensions of a few micrometers and still stand up to long use. We obtain 0.25 mm diameter tungsten wire from suppliers of electron microscope materials and cut it into 2 cm lengths with wire-cutters (which soon lose their edge from such hard use). We insert these lengths into hypodermic needles which provide a convenient base during etching and for subsequently mounting the finished needle on a handle. The needles are crimped to hold the wire firmly.

The tungsten is etched by dipping it and a carbon electrode (obtained from a small dry cell battery) into 10% sodium hydroxide solution and applying 12 volts A.C. between them. The tungsten wire is clamped so that about 2 mm dips into the solution and when the current is switched on, the tungsten is etched away through the meniscus around the wire. As etching progresses this meniscus recedes and a sharp conical tip is produced automatically. However, if this process is allowed to

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continue until the meniscus finally drops away from the wire, the result is a rather blunt tip. If the current is switched off just before this stage a very fine conical tip remains. This is achieved by monitoring the current flowing through the wire (which decreases from an initial level of about 500 mA) and switching it off when it drops below 30 mA. We have designed a circuit to do this electronically, but it can be done manually by connecting an A.C. current meter in series with the tungsten wire and switching the current off as soon as it begins to fall below 50 mA (this higher terminating current is to allow for the slower reaction time).

If the wire is dipped into the solution and 12 volts D.C. is used instead of A.C. (with the tungsten positive), a different process occurs which can also be used to advantage. After a few seconds the current falls because of polarisation, and electropolishing of the wire occurs; any prominences are preferentially etched away leaving a very smooth and highly polished surface. This may be done before the etching procedure described above to give the wire a preliminary clean and polish, or after it, which leaves the tip not quite as sharp as before but much smoother and therefore less likely to snag or bend in use. The actual procedure used depends on whether sharpness or durability is more important. The finished needles are washed under running water before mounting on a suitable handle. When it becomes necessary to re-sharpen them, the etching procedure is simply repeated.

LITERATURE CITED

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